STAYING AHEAD *OF THE CURVE WITH PFAS TESTING*

The Global PFAS Practice Lead for ALS meets the new Northeast USA Environmental Regional Manager for a transatlantic discussion about evolving PFAS testing challenges.

One of the key steps ALS took this year in advancing its leadership in PFAS testing innovation was the acquisition of York Analytical, announced in March. The acquisition expands ALS' environmental testing capabilities in the Northeast USA with the addition of laboratories across eight locations providing analysis of water, soil, air and drinking water for regulated contaminants, with significant expertise in PFAS testing.

Another key step was the appointment of technical director Geraint Williams as Global PFAS Practice Lead, based in the UK, to coordinate all of ALS' efforts on PFAS around the world.

When York became a part of ALS, Geraint and York's President Michael J. Beckerich, now also Regional Manager, Northeast USA for ALS, were excited to meet up to discuss how this combining of forces will help clients navigate and meet growing PFAS compliance challenges.

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Michael and Geraint invited us to capture their compelling discussion and share it with you, to offer you first-hand insight into how ALS will continue to innovate, lead, and serve our clients as they face the new landscape of increasing PFAS regulations.

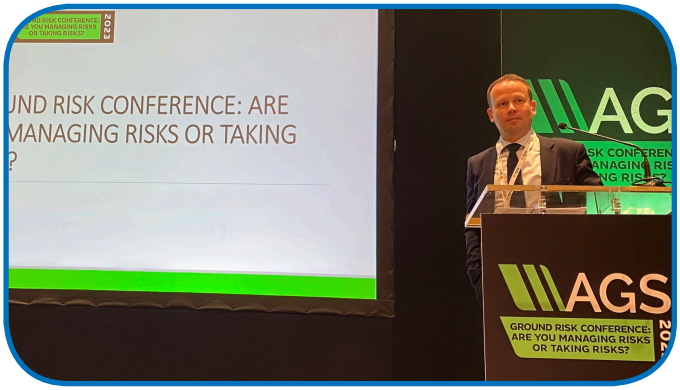
MICHAEL: So, Geraint, can you tell me about tell me about your new role at ALS and what it means to the larger company?

GERAINT: Yes, my new role as global practice lead for PFAS is aimed at standardizing some of the processes within ALS. We have many labs around the world, but there's always this requirement to come up with new, innovative approaches and methods for analyzing PFAS, and it's great that we can draw on our experiences from around the world.

So, if something is of particular interest in Europe, for instance, which potentially might be of relevance to the US in the future, then that would be something we could implement quite easily in the US. Having a single point of contact globally to manage that kind of process, I think it's an advantage.

MICHAEL: In the US, we've had a variety of methods with increasing sophistication for testing PFAS. It started with 537.1, and then 533 was introduced, and now we've got 1633. How does this compare to other countries?

GERAINT: Yes, I think the US will always lead on this. What the US does, often the rest of the world will follow. It's interesting. At the moment, there are 40 individual PFAS targeted in the initial 1633 method. The UK authorities regulate 47 PFAS, some of which are not part of the original 1633



Geraint Williams served as joint chair of the Association of Geotechnical and Geoenvironmental Specialist (AGS's) Ground Risk Conference.


GERAINT WILLIAMS

suite. Then there are other PFAS that are not regulated in the UK but probably will be regulated here in the future, and potentially in the US as well. This will be continuously evolving.

One PFAS of special concern is a constituent that's often found in firefighting foams. It's called 6:2 fluorotelomer sulfonamide alkylbetaine (6:2 FTAB). This is currently not regulated as part of any suite of analysis in many countries, but we're seeing high concentrations of it. So, it is currently of particular interest in Europe, and I suspect it might become more important internationally as well. Colleagues in Australia, the UK and some other countries are investigating this type of PFAS, but not in North America.

> "...We've developed an innovative approach for PFAS for analysis of firefighting foams. These are high-concentration samples that are tricky to analyze, but we have been developing methods to meet regulatory requirements around the world."
> - Geraint Williams

MICHAEL: A lot of the work we do here in the northeast of the US surrounds airports and firefighter foam testing and de-icing. How similar is de-icing material to firefighter foam?

GERAINT: De-icing contaminants are slightly different from those found in firefighting foam. You do see some PFAS that you'd find in hydraulic fluids, for instance, in hangers at airport sites, but interestingly what we're working on now is methods for PFAS in concrete. This is a potentially secondary source of contamination.

PFAS forms layers on surfaces of concrete, which can be quite porous. When we've carried out analysis of concrete cores, looking at the different depths, we've found the highest concentrations of PFAS near the surface. So, we've been developing methods to look at different leaching protocols for PFAS in concrete, but also how to prep those kinds of concrete core samples.

We are doing quite a lot of work in Europe on that because you could end up spending millions of dollars remediating a former fire-training site and then get secondary contamination from runoff from the concrete, which might have been missed in conceptual site models. So, certainly, an area of growing interest is PFAS in concrete.

MICHAEL: That's interesting, and I think our consultant clients, in particular, would be interested to know that we're looking at that.

A recurring question our clients have for me since we joined ALS is... 'Why did you join ALS? What do they bring to the table for you and us?' At the top of my list is the PFAS expertise at ALS. So what would you say about the ALS focus on PFAS around the globe that may differentiate ALS from other testing providers? Why would you say ALS is a leader and what is our strategy around PFAS?

"One of the non-regulated uses we have starting to see is companies that are trying to create methods to eradicate PFAS. As you know, there are many options for cleaning PFAS, but killing it is something else, and we're starting to see a host of manufacturers ask us to help test for these products."
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GERAINT: We are always working quite closely with our clients to fulfill their needs. So, for instance, we've developed an innovative approach for PFAS in foams. These are high-concentration samples that are tricky to analyze, but we have been developing methods to meet regulatory requirements around the world for the analysis of firefighting foams

Working with some of our clients, we've been able to develop a method for swabbing the surfaces of

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tanks as well because you get this residual build up whenever anybody's doing foam decontamination projects.

This issue of residual PFAS on the surfaces of tanks is similar to PFAS in concrete, actually.

Our method involves swabbing the surface of these tanks to understand if there's any potential impact from residual PFAS on surfaces that could contaminate fluorine-free foams. So again, there might be some potential liabilities.

More generally, around soils and groundwater, we've got a toolbox approach where we're able to analyze for the UK's standard targeted list of PFAS very similar to the 1633 method list, but we also have capabilities to analyze for non-targeted PFAS, using techniques like the total oxidizable precursor (TOP) assay. We also have capabilities to do total organic fluorine analysis, absorbable organic fluorine (AOF) and extractable organic fluorine (EOF), for instance.

And from a forensics point of view, we've got high-res mass spectrometry (MS) capabilities, so we use Thermo Scientific™ Orbitrap™ instruments that allow us to take more of a forensic approach in determining the sources of PFAS.

So whatever the particular requirements for a particular project, we've got all these options available, and these different approaches combine to offer a very complete package of techniques.

"We've got to be quite agile at developing new techniques ... We've done quite a lot of TOP assay analysis, and there is now a new approach to TOP assays using UV activation, which would save time and improve turnaround times, and help ensure better preservation of the perfluoroalkyl chain in the precursor structure and improve PFAS yield."
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MICHAEL: That's very helpful for serving the new types of clients that we're starting to see now because, as you know, regulations are driving work. The Northeast US states, particularly New York, is very aggressive. They've been requiring soil to be tested when there's waste characterization, and that has driven a lot of the demand.

One of the non-regulated uses we have starting to see is companies that are trying to create methods to eradicate PFAS. As you know, there are many options for cleaning PFAS, but killing it is something else, and we're starting to see a host of manufacturers ask us to help test for these products.

GERAINT: Yes, we're seeing this in Europe already. Europe is probably leading the way in terms of restricting the uses of PFAS.

We've seen in the past where certain individual PFAS have been restricted, and then you sometimes end up with regrettable substitutes; GenX chemicals are a good example.

In the UK, we've got a particular type of PFAS called EEA NH4. We've had to develop a method for that.

In Italy, we've got another particular type of PFAS called C6O4.

So, we're seeing all sorts of different types of PFAS that we're having to look at in different countries and develop methods for.

Interestingly, many of our clients have been working quite closely with us to develop new innovative approaches for investigating and assessing sites, and we're all getting pushed in terms of our limits of detection. We also work quite closely with some remediation contractors, and we're moving away from traditional sites.

We're seeing this around the world where, yes, people are looking at fire training areas, airport type sites, and sites that defense departments are involved in.

But now we're seeing a wider range of sites—chrome-plating works, landfill leachate, biosolids—different types of sites where testing is being carried out, and that means an extended list of PFAS because the PFAS that you find in different types of sites are not always going to be exactly the same. So it's a real challenge to keep track of all the different type of PFAS and sites that our clients are investigating.

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MICHAEL: Listening to you describe it, it's almost like an alien planet is putting all these different PFAS types around the world to try and attack us.

GERAINT: [laughing]: Yes.

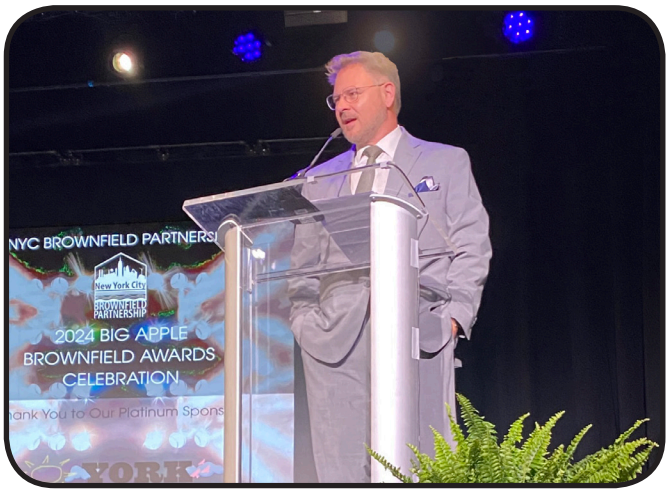
MICHAEL: Do you have any insight into advances in testing instrumentation that we're going to start seeing?

GERAINT: Yes, we have been working closely with all our instrument suppliers. I've just come back, for example, from a tour of Agilent's latest facilities in the UK.

As you know, Michael, the standard approach for carrying out PFAS analysis is triple quadrupole liquid chromatography (LC) MS, but in Europe, we're looking at some interesting regulated, highly volatile PFAS, where we're having to use gas chromatography (GC) MS analysis rather than LC because some of these volatile PFAS are not LC amenable. We're looking at two fluorotelomer alcohols, 6:2 and 8:2, which requires GC, but not just GC-MS. We're using GC–MS-MS to get down to the lowest sensitivity and the lowest selectivity.

Generally, with all kinds of techniques, there's always this trade-off between how inclusive the technique is, how sensitive the technique, and how selective the technique is. We're always getting pushed down in terms of our limits of detection for all the different techniques that we're offering.

MICHAEL: I do a lot of speaking locally here in the US with community groups and interested parties like realtors and developers about PFAS. I often inform them that it's all happened really fast. I mean, it was only five-and-a-half years ago that York built its first PFAS lab, and PFAS weren't even regulated yet.



Michael Beckerich shared insights on state of PFAS testing at a recent Brownfields event in NYC.

We started with an Agilent™ 6470 Triple Quadru pole LC-MS/MS System. As you know, that is not an easy analysis to do. People forget that this is hard, especially when you're looking at not-so-clean matrices like pond water, surface water or groundwater.

> "PFAS remediation is not going to be carried out in six months or a year. These are 20-year projects. The long-term liabilities associated with PFAS impacts to groundwater, drinking water, abstractions, etc. – these are huge, long-term projects."
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I mean, drinking water is one thing, and this is really where the challenge is, because clients are used to getting their suite of data, let's say in five or seven days, and they want the PFAS results along with that. So, the timing of that is presenting the industry with a bit of a challenge right now.

Is there a better way to do this? A faster way down the road? Or is this always going to be one of the most challenging things for our industry moving forward?

GERAINT: It is really difficult, isn't it? We strive to meet client expectations and requirements. We're always receiving so many PFAS samples in our labs; we need to keep looking forward and making sure we're ahead of the curve and have enough capacity, especially for some of these bigger projects we're involved in.

Even in Europe, we're seeing this quite regularly at the moment: where we've got only a certain capacity in the whole of the industry, not just ALS but the whole lab industry can't cope with the number of samples.

So we've got to invest.

We've got to be quite agile at developing new techniques, and there are new techniques out there. We're working quite closely with universities and looking at what kind of research is being done that might be applied to a commercial setting in the future.

One example of this is we've done quite a lot of TOP assay analysis, and there is now a new approach to TOP assays using UV activation, which would save time and improve turnaround times, but also help ensure better preservation of the perfluoroalkyl chain in the precursor structure and improve PFAS yield.

"Right now our standard turnaround is seven to ten days and we're mostly hitting seven days. We also offer a premium service to do a four-day turnaround. We can turn around soil characterization samples in four days, and it's really been a big driver for us. Part of that is having the capacity, but what we've learned is it's not necessarily about the LC–MS/MS instruments, but it's more about the prep. That's where all the speed comes in, so we've invested quite a bit in the prep work."
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Then, if it's possible to commercialize these techniques, we'll be one of the first labs to be able do that.

MICHAEL: That's great. And it really is the main reason why, when we were looking for the next road for York to take, we chose to join ALS. ALS is truly a lab company.

And this is so exciting to our people here because it enables us to keep building on what we've been doing. Marrying commercialization with technology and what's happening in academia is really our niche. It's what we have to do, and that's one of the reasons I wanted to ask you to share some of this information that may be out of our clients' specs.

Because our clients are focused on, "What do I need to do today to get this project approved?"

GERAINT: There are a lot of synergies between ALS and the York team from what I've heard from our teams in this region; especially, I understand that you're very client focused. We're also very client focused here, and work closely with them, even to the extent that we're providing advice in terms of the types of samples that can be collected and how they carry out the sampling; we provide them with specific guidance and advice.

MICHAEL: That's awesome. I'm so happy to be part of this team, and I know I speak for the 200-plus people at our sites.

Before we wrap up, can you tell me about when you first got involved with PFAS? And by the way, I know it's not your official title, but I call you ALS' PFAS Czar, and I think it's awesome that you have this role.

GERAINT: [laughing]: I like that title.

Well, Australia was looking at PFAS a long time before Europe, and the US always leads the way on this and I think always will. But the story behind PFAS analysis in the UK is there was an oil terminal just outside London that exploded, and they put out the fire, but they didn't have enough stock of firefighting foams, so they used PFAS-containing firefighting foams.

This happened in 2005, so we were one of the very first labs that were able to develop a method for analyzing PFAS back then. We've certainly expanded since then, but I'd say that incident sparked interest in PFAS in

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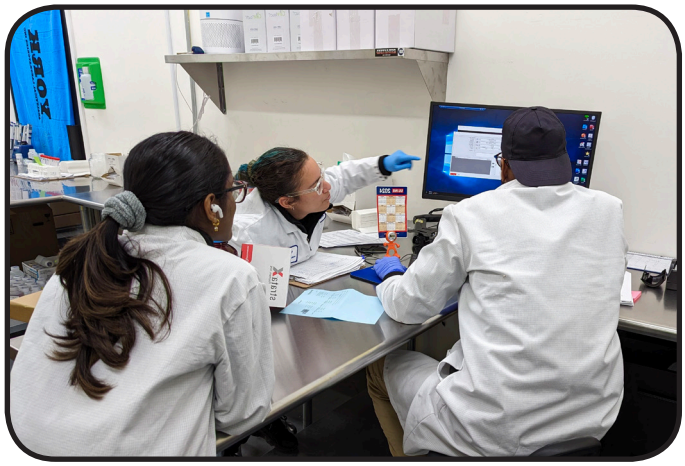
the UK, and it's really escalated since then, but we were far behind the US back in 2005.

So that's the history of why Europe and parts of the UK initially became interested in PFAS analysis. We've got a bit of catching up to do still today, but there has been progress in Europe in terms of legislation, and in terms of developing new methods.



MICHAEL: I didn't know that. That's very impactful.

GERAINT: And I'm still involved in it to this day, even at that site near London. And this reiterates what you were saying about the difficulty of remediation:

These are not projects where remediation is going to be carried out in six months or a year. These are 20-year projects. The long-term liabilities associated with PFAS impacts to groundwater, drinking water, abstractions, et cetera – these are huge, long-term projects.

MICHAEL: One last question about water districts: I believe that if COVID hadn't hit, PFAS in drinking water would be the biggest issue any of our townships here would be facing.

Are you seeing anything outside the US about procedures for cleaning drinking water that you think my might have some impact here?

GERAINT: No, I would say the US will lead the way on that aspect of PFAS as well. The conventional way to treat PFAS in drinking water has been granulated activated carbon. That has removed some of the longer-chain PFAS, but it's not that effective for some of the shorter-chain PFAS.

I think we're facing a big problem in the future with some of the ultra-short PFAS: things like trifluoroacetic acid (TFA), which the US is starting to address. I suspect TFA will be regulated in the future, and that's going to be very difficult to treat. Approaches like ion exchange or reverse osmosis have potential, but the cost is going to be enormous for the water utilities and companies in the US, so it depends on the direction regulations take for some of the ultra-short PFAS. It will be interesting to see how that plays out in the future.

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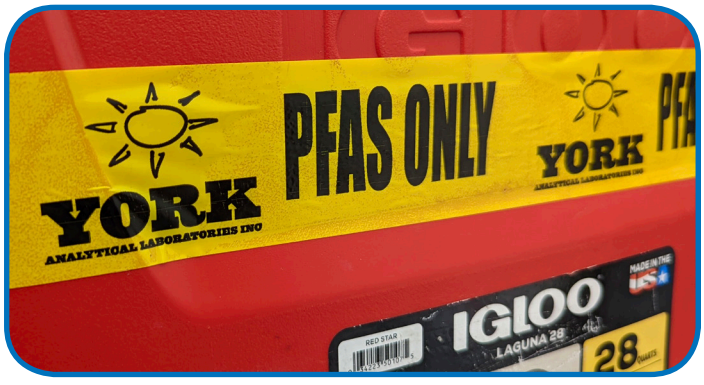
Again, we'd need to be ahead of the curve. We need to make sure we've got the latest methods to look at new and emerging PFAS. We have worked quite closely with some contractors involved in trying to clean up drinking water. We've done a lot of work with them, using high-resolution MS (HRMS) techniques to see what PFAS we might be missing. Looking not just for PFAS on the UK targeted list but using non-targeted techniques to look at what other PFAS are present in the environment.

One of the first kinds of samples we analyzed, interestingly, was wastewater effluent, and we were picking up all sorts of different types of PFAS that we weren't expecting to find. These are constituents in firefighting foams, but they were very unusual PFAS, which we would have missed if we didn't have HRMS capability.



MICHAEL: What year or time frame was that?

GERAINT: It was relatively recently when we analyzed this sample; about this time last year. We were looking at a whole range of non-targeted techniques and identified these unusual PFAS, but the regulators in the UK analyzed drinking water samples about three or four years ago, and that's how they determined the UK's regulated 47 PFAS.

Michael, I am interested to learn a bit about your capacity, the number of instruments you have and your current turnaround times.

MICHAEL: Yes, right now our standard turnaround is seven to ten days and we're mostly hitting seven days. We also offer a premium service to do a four-day turnaround.

We can turn around soil characterization samples in four days, and it's really been a big driver for us. Part of that is having the capacity, but what we've learned is it's not necessarily about the LC–MS-MS instruments, but it's more about the prep.

That's where all the speed comes in, so we've invested quite a bit in the prep work. For every LC-MS/MS system, and I think we have six now, we also have three PromoChrom™ sample prep systems. This lets us maximize the prep to meet our turnaround time targets.

GERAINT: We've been using PromoChrom systems in Europe as well.

MICHAEL: My team is interested in continuing to use Agilent instruments, too, and we've just ordered another LC-MS/MS system for our New Jersey location. So, the idea is to not run out of capacity, but to keep adding to it, because the marketplace is there.

GERAINT: Your turnaround times are very good compared to some other testing companies. You must be very competitive in the market if you can meet those kinds of turnaround times. I'm hearing three to four weeks turnaround times from some other companies.

MICHAEL: In fact, PFAS turnaround time been the biggest driver of having new clients try us out. We know this, so there's a conscious effort to maintain that. That's the plan.

So, onward and upward, Geraint. We strongly believe that with you and the team, we can continue to stay ahead of the curve. You mentioned that phrase earlier, and that's our focus here as well.

GERAINT: Good to hear.

MICHAEL: Thank you very much. This is part one of many conversations I hope we have, and I look forward to working together.

GERAINT: My pleasure. Thank you very much.

The team at York Analytical Laboratories | ALS would like to know about your PFAS needs, concerns and questions, share our insights, and talk to you about full-service testing and analysis services and affordable screening options.

We know what you're up against, and we will help you stay ahead of the curve on PFAS to meet the challenges ahead.

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ABOUT YORK ANALYTICAL

in 2024 York Analytical joined ALS Limited and its global network of laboratories to create the northeast region's most respected name in industrial and environmental PFAS testing. York has eight laboratory and client service facilities throughout New York, Connecticut and New Jersey, PFAS licensing in six northeast states, and provides comprehensive analyses of drinking and non-potable water, soil and air for regulated contaminants.

ABOUT ALS LIMITED

A global leader in testing, ALS provides comprehensive testing solutions to clients in a wide range of industries around the world. Using state-of-the-art technologies and innovative methodologies, our dedicated international teams deliver highest-quality testing services and personalized solutions supported by local expertise. We help our clients leverage the power of data-driven insights for a safer and healthier world.